

PO-IR-1

**Ref: HECO's research regarding electric and magnetic fields ("EMF")**

- a. Please produce copies of all studies, reports, analyses, surveys and other research concerning electric and magnetic fields ("EMF") that HECO has obtained, considered and/or compiled.

HECO Response:

- a. HECO has voluminous publications and articles regarding EMF, some of which may be recent, and some of which may be years old. Such information may be in various locations and with various individuals within the Company. In responding to this request, HECO has expended substantial efforts to identify and make available a voluminous amount of material, to the extent that the material appears to be reasonably responsive to the broadly-worded request, and does not fall within recognized privileges (such as the attorney-client privilege.)

At the same time, HECO objects to this information request on the grounds that (1) it is overly broad and unduly burdensome to produce a copy of "all" studies, reports, analyses, surveys and other research concerning EMF that HECO has obtained, considered and/or compiled; and (2) the terms "studies," "reports," "analyses," "surveys," and "other research" are vague and ambiguous and no definition of these terms has been provided. HECO also objects to this request to the extent it may encompass documents protected by the attorney-client privilege or the attorney work product doctrine. Nonetheless, HECO has expended substantial time and effort in identifying responsive documents. Seven HECO employees working full-time and part-time spent over 160 hours responding to the two information requests submitted by the Public Officials.

In order to be responsive to this request, HECO has (1) designated categories of

documents that might be deemed to fall within the scope of this request, (2) provided partial lists of documents falling within each category, and (3) identified the manner in which HECO is willing to make such documents available.

Please note that the EMF material that HECO has already provided to the parties/participants in this proceeding, including the Draft Environmental Assessment for the East Oahu Transmission Project, 46kV Phased Project, and the Revised Final EIS for the Kamoku-Pukele 138kV Transmission Line, as well as the testimonies of L. Erdreich, Ph.D. (HECO ST-11A), S. Aaronson, M.D. (HECO ST-11B), and M. Silva (HECO T-10) represents the most comprehensive information regarding EMF that HECO has available. A copy is not being provided as part of this IR response.

This response does not include various newsletters and EMF publications which are beyond the overbroad and ambiguous scope of this request. Examples of the types of publications which are beyond the scope of this request include: (1) confidential and copyrighted publications produced by the Electric Power Research Institute, Inc. (EPRI) (sometimes doing business as EPRI Solutions or EPRI GEN); (2) copyrighted publications produced by Edison Electric Institute (EEI); (3) confidential and copyrighted publications by ELF Gateway including ELF Gateway email and issues of "EMF News"; and (4) copyrighted issues of the EMF Health & Safety Digest magazine.

HECO's responses and objections with respect to each category of documents are addressed below:

A. Medical Journals

HECO has voluminous medical journal articles regarding EMF. A partial list of these medical journal articles is included as pages 6-14.

Please contact George Hirose at 543-4787 to make arrangements for a review of this voluminous material at HECO's Regulatory Affairs Office. These voluminous materials will be made available for review three business days after a request is received.

Certain publications that HECO proposes to make available to the parties and the Commission are protected by copyright laws, and the information would be made available under the "fair use" exception to the copyright laws. The use of such copyrighted materials by the recipients, and the copying of such materials, is subject to the copyright laws.

B. Electric Industry Publications

HECO has voluminous documents electric industry publications regarding EMF. A partial list is provided as page 15. Please contact George Hirose at 543-4787 to make arrangements for a review of this voluminous material at HECO's Regulatory Affairs Office. These voluminous materials will be made available for review two business days after a request is received.

Certain publications that HECO proposes to make available to the parties and the Commission are protected by copyright laws, and the information would be made available under the "fair use" exception to the copyright laws. The use of such copyrighted materials by the recipients, and the copying of such materials, is subject to the copyright laws.

C. Government Agency Publications

HECO has voluminous government agency publications regarding EMF. A partial list of these government agency publications is included as pages 16-18. Please contact George Hirose at 543-4787 to make arrangements for a review of this voluminous material at HECO's Regulatory Affairs Office. These voluminous materials will be made available for review three business days after a request is received.

Certain publications that HECO proposes to make available to the parties and the Commission are protected by copyright laws, and the information would be made available under the “fair use” exception to the copyright laws. The use of such copyrighted materials by the recipients, and the copying of such materials, is subject to the copyright laws.

D. Books

HECO has voluminous books regarding EMF. A partial list of these books is included as page 19. Please contact George Hirose at 543-4787 to make arrangements for a review of this voluminous material at HECO’s Regulatory Affairs Office. These voluminous materials will be made available for review two business days after a request is received.

The books that HECO proposes to make available to the parties and the Commission are protected by copyright laws, and the information would be made available under the “fair use” exception to the copyright laws. The use of such copyrighted materials by the recipients, and the copying of such materials, is subject to the copyright laws.

E. Regulatory Related Filings

HECO has submitted numerous documents to the Public Utilities Commission (with a copy to the Division of Consumer Advocacy) that provide EMF-related information. These documents include testimonies, exhibits, Environmental Assessments, Environmental Impact Statements, and responses to information requests. In addition, the Division of Consumer Advocacy and other parties to PUC proceedings have submitted EMF-related information. A partial list of this voluminous material is provided as pages 20-23.

Please contact George Hirose at 543-4787 to make arrangements for a review of this voluminous material at HECO’s Regulatory Affairs Office. These voluminous materials

will be made available for review three business days after a request is received.

F. Environmental Assessments/Environmental Impact Statements (EAs/EIS)

Environmental Assessments and Environmental Impact Statements have been submitted to various City or State agencies for HECO projects. The EA's and EIS' include a discussion on EMF. A partial list of the EA's/EIS' is provided as page 24.

Please contact George Hirose at 543-4787 to make arrangements for a review of this voluminous material at HECO's Regulatory Affairs Office. These voluminous materials will be made available for review two business days after a request is received.

G. Customer Surveys

At the request of a customer, HECO will measure the EMF levels in a customer's residence. HECO has conducted over 500 customer requested EMF surveys since the early 1990's. See attached page 25 for a summary of the EMF survey requests and EMF surveys that have been conducted. An example of a redacted customer EMF survey is attached as pages 26-28. HECO objects to the production of customer-specific information (i.e., customer name and address) on the grounds that (1) such information is confidential and has been protected from disclosure by the Commission in other proceedings, and (2) the disclosure of such information has not been consented to by the customers. HECO is willing to make the over 500 customer surveys available for review although customer-specific information will be redacted from copies made available for review. This material will be made available for review two weeks after a request is received.

# **List of Available EMF Related Studies**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 6 OF 28

	<b>Title</b>	<b>Date</b>
1	"A Study of the Biological Effects of Certain ELF Electromagnetic Fields," Krueger, A. P. et al., Int. & Biometeor, Vol. 19, No. 3: 194-201 (1975)	1975
2	"Effects of a High-Tension Electric Field on the Secretion of Antidiuretic Hormone in Rats," Carmaciu, R. et al., Physiologie, Vol. 14, No. 2: 79-83 (1977)	1977
3	"Electrical Wiring Configurations and Childhood Cancer," Wertheimer, Nancy et al., American Journal of Epidemiology, Vol. 109, No. 3: 273-284 (1979)	1979
4	"Calcium-Ion Efflux From Brain Tissue: Power-Density Versus Internal Field-Intensity Dependencies at 50-MHz RF Radiation," Blackman, C. F. et al., Bioelectromagnetics, Vol. 1: 277-283 (1980)	1980
5	"Effects of 60-Hz Electric Fields on Avoidance Behavior and Activity of Rats," Hjeresen, Dennis L. et al., Bioelectromagnetics, Vol. 1: 299-312 (1980)	1980
6	"Electrical Wiring Configurations & Childhood Leukemia in Rhode Island," Fulton, John P., et al., American Journal of Epidemiology, Vol. 111, No. 3: 292-296 (1980)	1980
7	"Corticosterone Levels in Mice Exposed to High-Intensity Electric Fields," Hackman, Robert M. et al., Behavioral and Neural Biology, Vol. 32: 201-213 (1981)	1981
8	"Effects of Intermittent 60-Hz High Voltage Electric Fields on Metabolism, Activity, and Temperature in Mice," Rosenberg, R. S. et al., Bioelectromagnetics, Vol. 2: 291-303 (1981)	1981
9	"Endocrinological Effects of Strong 60-Hz Electric Fields on Rats," Free, Michael J. et al., Bioelectromagnetics, Vol. 2: 105-121 (1981)	1981
10	"Effects of 60-HZ Electric Fields on Specific Humoral and Cellular Components of the Immune System," Morris, J. E. et al., Bioelectromagnetics, Vol. 3: 341-347 (1982)	1982
11	"Mortality from Leukemia in Workers Exposed to Electrical & Magnetic Fields," Milham, Samuel, Jr., M.D., New England Journal of Medicine, Vol. 307, No. 4: 249 (1982)	1982
12	"Behavioral Detection of 60-Hz Electric Fields by Rats," Stern, Sander et al., Bioelectromagnetics, Vol. 4: 215-247 (1983)	1983
13	"Hematologic and Serum Chemistry Studies in Rats Exposed to 60-Hz Electric Fields," Ragan, H. A. et al., Bioelectromagnetics, Vol. 4: 79-90 (1983)	1983
14	"Relationship Between Field Strength and Arousal Response in Mice Exposed to 60-Hz Electric Fields," Rosenberg, Richard S. et al., Bioelectromagnetics, Vol. 4: 181-191 (1983)	1983
15	"Suppression of T-Lymphocyte Cytotoxicity Following Exposure to Sinusoidally Amplitude-Modulated Fields," Lyle, Daniel B. et al., Bioelectromagnetics, Vol. 4: 281-292 (1983)	1983
16	"Studies on Prenatal and Postnatal Development in Rats Exposed to 60-Hz Electric Fields," Sikov, M. R. et al., Bioelectromagnetics, Vol. 5: 101-112 (1984)	1984
17	WHO - Environmental Health Criteria 35: Extremely Low Frequency (ELF) Fields (WHO, Geneva '84)	1984

# **List of Available EMF Related Studies**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 7 OF 28

18	"Mortality in Workers Exposed to Electrocomagnetic Fields," Milham, Samuel, Jr., Environmental Health Perspectives, Vol. 62: 297-300 (1985)	1985
19	"Neuroendocrine Parameters in the Rat Exposed to 60-Hz Electric Fields," Quinlan, William J. et al., Bioelectromagnetics, Vol. 6: 381-389 (1985)	1985
20	"50-Hz Electromagnetic Environment and the Incidence of Childhood Tumors in Stockholm County," Tomenius, Lennart, Bioelectromagnetics, Vol. 7: 191-207 (1986)	1986
21	"Mortality of Persons Resident in the Vicinity of Electricity Transmission Facilities," McDowall, M. E., Br. J. Cancer, Vol. 53: 271-279 (1986)	1986
22	"Cancer Incidence Among Welders: Possible Effects of Exposure to Extremely Low Frequency Electromagnetic Radiation (ELF) & to Welding Fumes," Stern, R. M., Environmental Health Perspectives, Vol. 76: 221-229 (1987)	1987
23	WHO - Environmental Health Criteria 69: Magnetic Fields (WHO, Geneva '87)	1987
24	"Case-Control Study of Childhood Cancer & Exposure to 60-HZ Magnetic Fields," Savitz, David A. et al., American Journal of Epidemiology, Vol. 128, No. 1: 21-38 (1988)	1988
25	"Development of Young Rats and Rabbits Exposed to a Strong Electric Field," Portet, R. et al., Bioelectromagnetics, Vol. 9: 95-104 ( 1988)	1988
26	"Increased Mortality in Amateur Radio Operators Due to Lymphatic & Hematopoietic Malignancies," Milham, Samuel, Jr. , American Journal of Epidemiology, Vol. 127, No. 1: 50-54 (1988)	1988
27	"Occupational Exposures and Brain Cancer Mortality: A Preliminary Study of East Texas Residents," Speers, Marjorie A. et al., American Journal of Industrial Medicine, Vol. 13: 629-638 (1988)	1988
28	"Suppression of T-Lymphocyte Cytotoxicity Following Exposure to 60-Hz Sinusoidal Electric Fields," Lyle, Daniel B. et al., Bioelectromagnetics, Vol. 9: 303-313 (1988)	1988
29	"The Effects of the Pulsing Magnetic Field on the Cerebral Circulation, EEG Power Spectra and Some Properties of the Blood. A Preliminary Data," Bartko, D. et al., Journal of Bioelectricity, Vol. 7, No. 1: 131-132 (1988)	1988
30	"Association of Childhood Cancer with Residential Traffic Density," Savitz, David A., Ph. D., Scand J Work Environ Health, Vol. 15: 360-363 (1989)	1989
31	"Biological Effects on Swine and Primates Due to Power Frequency and Radio Frequency Radiation," Mahmoud, A. A. et al., Electric Power Systems Research, Vol. 17: 29-34 (1989)	1989
32	"Chronic Exposure of Primates to 60-Hz Electric and Magnetic Fields: II. Neurochemical Effects," Seegal, Richard F. et al., Bioelectromagnetics, Vol. 10: 289-301 (1989)	1989
33	"Detection-Threshold of 50-Hz Electric Fields by Human Subjects," Kato, M. et al., Bioelectromagnetics, Vol. 10: 319-327 (1989)	1989
34	"Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields (1989)" - Radiation Health Series No. 30, 11/89 - National Health and Medical Research Council	1989

# **List of Available EMF Related Studies**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 8 OF 28

35	"Multiple Power-Density Windows and Their Possible Origin," Blackman, C. F. et al., Bioelectromagnetics, Vol. 10: 115-128 (1989)	1989
36	"Search for Cyclotron Resonance in Cells In Vitro," Parkinson, W. C. et al., Bioelectromagnetics, Vol. 10: 129-145 (1989)	1989
37	"Electric and Magnetic Fields from 60 Hertz Electric Power: What do we know about possible health risks?," 1989 - Dept. of Engineering and Public Policy, Carnegie Mellon University	1989
38	Electromagnetic Fields & Energy, H Haus, J Melcher, 1998, pp1-742, C:1989 Prentice-Hall, Inc, division of Simon & Schuster, New Jersey	1989
39	"Importance of Alignment Between Local DC Magnetic Field and an Oscillating Magnetic Field in Responses of Brain Tissue In Vitro and In Vivo," Blackman, C. F. et al., Bioelectromagnetics, Vol. 11: 159-167 (1989)	1990
40	"Magnetic Field Exposure from Electric Appliances & Childhood Cancer," Savitz, David A., et al., American Journal of Epidemiology, Vol. 131, No. 5: 763-773 (1990)	1990
41	"Calcium Uptake by Leukemic and Normal T-Lymphocytes Exposed to Low Frequency Magnetic Fields," Lyle, Daniel B. et al., Bioelectromagnetics, Vol. 12: 145-156 (1991)	1991
42	"Cancer Promotion in a Mouse-Skin Model by a 60-Hz Magnetic Field: II. Tumor Development and Immune Response," McLean, Jack R. N. et al., Bioelectromagnetics, Vol. 12: 273-287 91991)	1991
43	"Prenatal Exposure to Parents' Smoking & Childhood Cancer," John, Esther M., et al., American Journal of Epidemiology, Vol. 133, No. 2: 123-132 (1991)	1991
44	"The Influence of Temperature During Electric- and Magnetic-Field-Induced Alteration of Calcium-Ion Release From In Vitro Brain Tissue," Blackman, C. F. et al., Bioelectromagnetics, Vol. 12: 173-182 91991)	1991
45	"A Review of the Literature on Potential Reproductive and Developmental Toxicity of Electric and Magnetic Fields," Chernoff, Neil et al., Toxicology, Vol. 74: 91-126 (1992)	1992
46	"Calcium Binding to Metallochromic Dyes and Calmodulin in the Presence of Combined, AC-DC Magnetic Fields," Bruckner-Lea, Cindy et al., Bioelectromagnetics, Vol. 13: 147-162 (1992)	1992
47	"Incidence of Cancer in Norwegian Workers Potentially Exposed to Electromagnetic Fields," Tynes, Tore et al., American Journal of Epidemiology, Vol. 136, No. 1: 81-88 (1992)	1992
48	"Occupational Exposure to Electromagnetic Fields in Relation to Leukemia and Brain Tumors," Floderus, Birgitta et al., National Institute of Occupational Health (1992)	1992
49	"Rats Are Not Aversive When Exposed to 60-Hz Magnetic Fields at 3.03 mT," Lovely, R. H. et al., Bioelectromagnetics, Vol. 13: 351-362 ( 1992)	1992
50	"Questions & Answers About Electric & Magnetic Fields (EMFs)," Environmental Protection Agency, Radiation & Indoor Air Radiation Studies Division (6603J), 402-R-92-009, Dec 1992, C:EPA	1992
51	Electromagnetic Fields and the Risk of Cancer, Volume 3, No. 1, 1992 - National Radiological Protection Board (NRPB)	1992
52	"Cancer Mortality and Residence Near Electricity Transmission Equipment: A Retrospective Cohort Study," Schreiber, Gerrit H. et al., International Journal of Epidemiology, Vol. 22, No. 1: 9-15 (1993)	1993



# **List of Available EMF Related Studies**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 9 OF 28

53	"Health Effects of Power-Line Electromagnetic Fields (EMFs)," C Redhead, C Dodge, Issue Brief, Feb 8, 1993, pp1-14, Congressional Research Service, The Library of Congress, Science Policy Research Division, Order Code IB92118	1993
54	"Incidence of Cancer in Persons with Occupational Exposure to Electromagnetic Fields in Denmark," P Guenel, P Raskmark, British Journal of Industrial Medicine, 1993 Vol 50, pp 759-764	1993
55	"The National Electric & Magnetic Fields Research & Communication Program: Draft Strategic Plan," US Department of Energy, Washington, DC, May 1993, C:DOE	1993
56	Fields from Electric Power, 1995 - Dept of Engineering and Public Policy, Carnegie Mellon University	1995
57	Power Frequency Magnetic Fields and Public Health, (9420; ISBN 0-8493-9420-1), 1995 - William F. Horton, Saul Goldberg	1995
58	"Monitoring of Ongoing Research on the Health Effects of High Voltage Transmission Lines," K Wasti, Feb 26, 1996, Eleventh Annual Report submitted to the Virginia General Assembly, 1996 Session, Bureau of Toxic Substances Virginia Department of Health, Richmond, VA 23218, C:Virginia Department of Health	1996
59	Possible Health Effects of Exposure to Residential Electric and Magnetic Fields, (ISBN 0-309-05099-5), 1996 - National Research Council	1996
60	Possible Health Effects of Exposure to Residential Electric and Magnetic Fields, 1996 - National Research Council, (Prepublication Copy)	1996
61	"Possible Health Effects of Exposure to Residential Electric & Magnetic Fields," C Stevens, Chairman, Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems, 1977, pp1-356, C:National Academy of Sciences	1997
62	"Transmission Lines Magnetic Field Management Feasibility under Cost Constraints", Electric Power Systems Research 41 (1997) 43-65 - A.S. Farag, J.M. Bakhashwain, A.M. Al-Shehri, T.C. Cheng, D. Penn, E. Zou, P. Schultz, S. Polo, S. Kang	1997
63	"Increased Exposure to Pollutant Aerosols Under High Voltage Power Lines," A Fewes, D Henshaw, International Journal of Radiation Biology, 1999, Vol 75 No 12, pp1505-1521, C:Taylor & Francis Ltd.	1999
64	"Corona Ions from Powerlines & Increased Exposure to Pollutant Aerosols," A Fewes, D Henshaw, International Journal of Radiation Biology, 1999, Vol 74 No 12, pp1523-1531, C:Taylor & Francis Ltd.	1999
65	Health Effects from Exposure to Power Line Frequency Electric & Magnetic Fields, (#99-4493), 1999 - NIEHS Working Group Report 1999	1999
66	NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric & Magnetic Fields, (prepared in response to the 1992 Energy Policy Act (PL 102-486, Section 2118) National Institute of Environmental Health Sciences, National Institutes of Health, No 99-4493, May 1999, pp1-80 C:NIEHS	06/21/05
67	Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992, (ISBN 0-309-06543-7), 1999 - National Research Council	1999

## List of Available EMF Related Studies

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 10 OF 28

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| 68 | "Biological & Health Effects from Exposure to Power-Line Frequency Electromagnetic Fields: Confirmation of Absence of Any Effects at Environmental Field Strengths," (translated from the original Japanese edition: "Denjikai no Kenko Eikyo Sono Anzensei wo Kenshosuru," (published by Bundodo Co Ltd, Japan) H Takebe, T Shiga, M Kato, E Masada, 2001, English translation published by Ohmsha Ltd, 3-1 Kanda Nishiki-cho, Chiyoda-ku, Tokyo 101-8460, Japan, C: Takebe, Shiga, Kato, Masada | 2001     |
| 69 | ELF Electromagnetic Fields and the Risk of Cancer - Report of an Advisory Group on Non-ionising Radiation Volume 12 No 1 2001 (ISSN 0958-5648; ISBN 0-85951-456-0), 2001 - National Radiological Protection Board   | 2001     |
| 70 | "The Effects of Proximity to High Voltage Electrical Wires on Human Health," Strumza, M. V., Archives des Maladies Professionnelles, de Medecine du Travail et de Securite Sociale, Vol. 31, No. 6: 269-276 (06/70)   | 06/70    |
| 71 | Biological Effects of High-Strength Electric Fields on Small Laboratory Animals, 07/81 - US Dept. of Energy (DOE/RL/01830-T7)   | 07/81    |
| 72 | "Leukaemia Mortality in Electrical Workers in England & Wales," McDowall, Michael E., The Lancet, 246, 1/29/83  | 01/29/83 |
| 73 | "Leukaemia Incidence in Electrical Workers," Coleman, Michel, et al., The Lancet, 982-983, 4/30/83  | 04/30/83 |
| 74 | "Reduced Mitogenic Stimulation of Human Lymphocytes by Extremely Low Frequency Electromagnetic Fields," Conti, P. et al., FEBS Letters (Federation of European Biochemical Societies), Vol. 162, No. 1: 156-160 (10/83)   | 10/83    |
| 75 | Electrical Effects of Alternating Current Transmission Facilities: An Assessment of the Available Evidence, 08/85 - New England Hydro-Transmission Corp./New England Hydro-Transmission Electric Co., Inc.  | 08/85    |
| 76 | Electrical Effects of Direct Current Transmission Facilities: An Assessment of the Available Evidence, 08/85 - New England Hydro-Transmission Corp./New England Hydro-Transmission Electric Co., Inc.   | 08/85    |
| 77 | "Case-Control Study of Childhood Cancer & Residential Exposure to Electric and Magnetic Fields," Savitz, David A., Ph. D., New York State Power Lines Project Wadsworth Center for Laboratories & Research, 3/30/1987   | 03/30/87 |
| 78 | "Infant Feeding & Childhood Cancer," Davis, Margaret K., et al., The Lancet, 365-368  | 08/13/88 |
| 79 | U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989)  | 05/89    |
| 80 | "Magnetic Field Exposure from Electric Appliances and Childhood Cancer," David Savitz, American Journal of Epidemiology, Vol 131, No. 5, 1990   | 07/17/89 |
| 81 | Potential Health Effects of Electric and Magnetic Fields from Electric Power Facilities, 9/15/89 - California PUC/California Dept. of Health Services   | 09/15/89 |
| 82 | Evaluation of the Potential Carcinogenicity of Electromagnetic Fields - Review Draft, (EPA/600/6-90/005B), 10/90 - EPA  | 10/90    |

# **List of Available EMF Related Studies**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 11 OF 28

83	Progress Report to the California State Legislature by the California Department of Health Services in Cooperation with the California Public Utilities Commission on the Electromagnetic Fields Health Effects Program, 12/1/90	12/01/90
84	NIOSH Workshop on National EMF Research Agenda, 2/1/91 C+M Sciences Group, EMF Unit	02/01/91
85	"Research Strategy for Electric and Magnetic Fields: Research Needs and Priorities," Office of Research and Development Washington D.C., EPA/600/9-91/016A (06/91)	06/91
86	"Exposure to Residential Electric and Magnetic Fields and Risk of Childhood Leukemia," London, Stephanie J. et al., American Journal of Epidemiology, Vol. 134, No. 9: 923-936 (11/01/91)	11/01/91
87	Potential Carcinogenicity of Electromagnetic Fields, 1/29/92 - US Environmental Protection Agency	01/29/92
88	"Health Effects of Exposure to Powerline-Frequency Electric & Magnetic Fields," Public Utility Commission of Texas, Austin, Texas, March 1992	03/92
89	"Health Effects of Low-Frequency Electric & Magnetic Fields," Prepared by Oak Ridge Associated Universities (ORAU) Panel for Committee on Interagency Radiation Research & Policy Coordination (CIRRPC), Jun 1992, contract DE-AC05-760R00033 between ORAU & DOE, C:ORAU	06/92
90	"Cancer of Breast Among Men in Electrical Occupations," Loomis, Dana P., The Lancet, Vol. 339, No. 8807: 1482-1483 ( 06/13/92)	06/13/92
91	"High-Voltage Transmission Lines: Summary of Health Effects Studies," Staff Report, California Energy Commission, Jul 1992, P700-92-002, pp1-27, C:CEC	07/92
92	"Cohort & Nested Case-Control Studies of Hematopoietic Cancers & Brain Cancer among Electric Utility Workers," J. Sahl, Epidemiology Resources Inc., 1993	09/18/92
93	"Residence Near High-Voltage Facilities and the Risk of Cancer in Children," Olsen, Jorgen H. et al., Cancer Registry of the Danish Cancer Control Agency, (10/92)	10/92
94	"Cancer Incidence in Danish Persons Who Have Been Exposed to Magnetic Fields at Work," Guenel, Pascal, et al., Cancer Registry of the Danish Cancer Control Agency, 10/06/92	10/06/92
95	"Magnetic Fields of Video Display Terminals and Spontaneous Abortion," Lindbohm, Marja-Liisa, et al., American Journal of Epidemiology, Vol. 136, No. 9: 1041-1051 (10/06/92)	11/01/92
96	"Cohort and Nested Case-Control Studies of Hematopoietic Cancers and Brain Cancer Among Electric Utility Workers," Sahl, Jack D. et al., Epidemiology, Vol. 4, No. 2: 104-114 (3/93)	3/93
97	"Leukemia in Telephone Linemen," G Matanoski, American Journal of Epidemiology, Mar 15, 1993, Vol 137 No 6, pp609-619, C: AJE	03/15/93
98	"Occupational exposure to electromagnetic fields in relation to leukemia and brain tumors: a case-control study in Sweden," B. Floderus, Cancer and Causes and Control, Vol 4: 465-476 (1993)	03/24/93
99	Do Electric or Magnetic Fields Cause Adverse Health Effects?: HEI's Research Plan to Narrow the Uncertainties. Health Effects Institute/EPA, June 1993.	06/93

# **List of Available EMF Related Studies**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 12 OF 28

100	"Exposure to Magentic Fields among Electrical Workers in Relation to Leukemia Risk in Los Angeles County," S. J. London, American Journal of Industrial Medicine 26:47-60 (1994)	08/02/93
101	"Cancer Risks Associated with Occupational Exposure to Magnetic Fields among Electric Utility Workers in Ontario and Quebec, Canaca, and France: 1970-1989, G. Theriault, 01/12/94	01/12/94
102	"The Question of Health Effects from Exposure to Electromagnetic Fields," W Hendee, J Boteler, Health Physics, Feb 1994, Vol 66 No 2, pp127-136, C:Health Physics Society	02/94
103	Electric Power Systems: Transmission and Distribution and Electric and Magnetic Fields Effects; Current Abstracts. U.S. Dept of Energy, March-April 1994, DOE/EPs-94/2 (PB94-920202)	03/94
104	"Cancer Risks Associated with Occupational Exposure to Magnetic Fields Among Electric Utility Workers in Ontario & Quebec, Canada, & France: 1970-1989," G Theriault, M Goldberg, et al., American Journal of Epidemiology, Mar 15, 1994, Vol 139 No 6, pp550-572, C: John Hopkins University School of Hygiene & Public Health	03/15/94
105	"Breast Cancer Mortality Among Female Electrical Workers in the United States," D Loomis, D Savitz, C Ananth, Journal of the National Cancer Institute, Vol 86 No 12, Jun 15, 1994, pp921-925, C:JNCI	06/15/94
106	"Study Suggests Higher Breast Cancer Death Risk Among Female Electrical Workers," Press Release, Journal of the National Cancer Institute, June 15, 1994, Vol 86 No 12, C:JNCI	06/15/94
107	"Magnetic Field Exposure in Relation to Leukemia and Brain Cancer Mortality among Electric Utility Workers," David Savitz, American Journal of Epidemiology, Vol 141 No. 2, 1995	11/01/94
108	"Questions and Answers About EMF Electric and Magnetic Fields Associated with the Use of Electric Power," (DOE/EE-0040), 01/95 - National Institute of Environmental Health Sciences & U.S. Dept. of Energy	01/95
109	Electric and Magnetic Fields and Human Health, A review of the Issues and the Science, 04/95 - Jack D. Sahl/Barbara Scott Murdock	04/95
110	"Background Paper On Powerline Fields & Public Health," David Hafemeister, 5/8/1995	05/08/95
111	Electric Power Systems: Transmission and Distribution and Electric and Magnetic Fields Effects; Current Abstracts. U.S. Dept of Energy, July-Aug 1995, DOE/EPs-95/4 (PB95-920204)	07/95
112	"Enhanced deposition of radon daughter nuclei in the vicinity of power frequency electromagnetic fields," D.L. Henshaw, Int. J. Radiat. Biol 1996, Vol 69, No. 1, 25-38	07/18/95
113	"Risk to Students in School," U.S. Congress, Office of Technology Assesment, OTA-ENV-633, Sept 1995	09/95
114	"Occupations with Exposure to Electromagnetic Fields: A Possible Risk Factor for Alzheimer's Disease," E. Sobel, American Journal of Epidemiology, Sept 1995, Vol 142 No 5, pp 515-524, C:John Hopkins School of Hygiene & Public Health	09/95
115	"Electromagnetic Field Exposure & Cancer: A Review of Epidemiologic Evidence," C Heath, Jr., MD, American Cancer Society, Jan/Feb 1996, Vol 46 No 1, pp29-44, C:ACS	01/96

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PO-IR-1  
DOCKET NO. 03-0417  
PAGE 13 OF 28

116	"Electric Power Systems, Transmission and Distribution and Electric and Magnetic Fields Effects," (DOE/EP--96/2; PB96-920202), 03-04/96 - Office of Scientific and Technical Information, U.S. DOE, Mar. - Apr. 1996	03-04/96
117	Swedish Government EMF Position Information - "Occupational exposure to electromagnetic fields in relation to leukemia and brain tumors: a case-control study in Sweden," B. Floderus, Cancer and Causes and Control, Vol 4: 465-476 (1993)	03/11/96
118	Questions and Answers EMF in the Workplace, (DOE/GO-10095-218; DE95013123), 09/96 - Nat'l Inst for Occupational Safety and Health; Nat'l Inst of Environmental Health Sciences; & U.S. Dept. of Energy	09/96
119	"Magnetic fields of high voltage power lines and risk of cancer in Finnish adults: nationwide cohort study, BMJ No. 7064 Volume 313, October 26, 1996	11/06/96
120	"Elevated Risk of Alzheimer's Disease Among Workers with Likely Electromagnetic Field Exposure," E. Sobel, Neurology, Dec 1996, Vol 47 No 6, pp1477-1481, C:American Academy of Neurology	12/96
121	"Residential Exposure to Magnetic Fields & Acute Lymphoblastic Leukemia in Children," M Linet, New England Journal of Medicine, July 3, 1997, Vol 337 No 1, pp1-7, C:Massachusetts Medical Society	07/03/97
122	"Electromagnetic Field Exposure May Cause Increased Production of Amyloid Beta & Eventually Lead to Alzheimer's Disease," E. Sobel, Neurology, Dec 1997, 47:1594-1600, C:American Academy of Neurology	12/97
123	"Stimulation of Src Family Protei-tyrosine Kinases as a Proximal and Mandatory Step for SKY Kinase-dependent Phospholipase C $\gamma$ 2 Activation in Lymphoma B Cells Exposed to Low Energy Electromagnetic Fields," Ilker Dibirdik, Journal of Biol Chem, Vol. 273, Issue 7, 4035-4039, February 13, 1998	02/13/98
124	Savitz Heart Disease Study - "Magnetic Field Exposure and Cardiovascular Disease Mortality among Electric Utility Workers, David A. Savitz, American Journal of Epidemiology, Vol. 149, No. 2: 135-142	05/01/98
125	"Power-Frequency Electric and Magnetic Fields and Risk of Childhood Leukemia in Canada," M.L. McBride, American Journal of Epidemiology, Vol 149, No.9: 831-842 (1999) - Canadian Study - 04/99 - Childhood Leukemia Study	08/11/98
126	"Guideline for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)," International Commission on Non-Ionizing Radiation Protection, Health Physics Society, 1998	09/30/98
127	"Exposure to power-frequency magnetic fields and the risk of childhood cancer, The Lancet, Vol 354: 1925-31, Decemember 4, 1999, Prof. Nick Day	12/04/99
128	Review & Commentary of "Exposure to Electromagnetic Fields & Suicide Among Electric Utility Workers: A Nested Case-Control Study," E van Wijngaardern, DA Savitz, (Occupational & Environmental Medicine, Apr. 2000, Vol 57, pp 258-263), Technical Memorandum, Mar 29, 2000, pp1-2	04/00
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PO-IR-1  
DOCKET NO. 03-0417  
PAGE 14 OF 28

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133	"Medical Follow-Up Study of High Voltage Linemen Working in AC Electric Fields," Singewald, R. L., M. D. et al., 1307-1309	
134	"Risk of Childhood Cancer in Relation to Parental Occupation," Feingold, L., Society for Epidemiologic Research Abstracts, 912	
135	"Investigation of Childhood Leukemia on the Waianae Coast 1977-1990," Gertraud Maskarinec, Office of Health Status Monitoring, Hawaii State Department of Health, July 1992	1994
136	"Survey of Reproductive Health among Female MR Workers," Emanuel Kanal, Radiology 187:395-399 (1993)	04/30/97
137	"A case control study of childhood leukemia in southern Ontario, Canada, and exposure to magnetic fields in residences," Lois M. Green, Int. J. Cancer, 82, 161-170 (1999)	01/04/99
138	"Exposure to Magnetic Fields among Electrical Workers in Relation to Leukemia Risk in Los Angeles County," S. J. London, American Journal of Industrial Medicine 26:47-60 (1994)	1995
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143	"Magnetic Field Exposure in Relation to Leukemia and Brain Cancer Mortality among Electric Utility Workers," David A. Savitz, American Journal of Epidemiology, Vol. 141, No. 2: 123-134, (1995)	1995
144	"Childhood leukemia and personal monitoring of residential exposures to electric and magnetic fields in Ontario, Canada," Lois M. Green et al, Cancer Causes and Control 10: 233-243, (1999)	1999

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PO-IR-1  
DOCKET NO. 03-0417  
PAGE 15 OF 28

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4	Electric and Magnetic Fields, Electricity Supply Association of Australia Ltd. (ESSA), 04/92	04/92
5	Electric Reliability Council of Texas (ERCOT) Guidelines Manual for Electric & Magnetic Field Measurements. Electric Liability Council of Texas. (A working paper of the ERCOT EMF Task Force).	02/05/92
6	Electrical Effects of Alternating Current Transmission Facilities: An Assessment of the Available Evidence, 08/85 - New England Hydro-Transmission Corp./New England Hydro-Transmission Electric Co., Inc.	08/85
7	Electrical Effects of Direct Current Transmission Facilities: An Assessment of the Available Evidence, 08/85 - New England Hydro-Transmission Corp./New England Hydro-Transmission Electric Co., Inc.	08/85
8	Electricity Supply Association of Australia Ltd. (ESSA), 03/92	03/92
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10	Electricity Supply Association of Australia Ltd. (ESSA), 09/91	09/91
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12	Fields from Electric Power, 1995 - Dept of Engineering and Public Policy, Carnegie Mellon University	1995
13	Human Reactions to ELF Electric and Magnetic Fields--An Annotated Bibliography of Current Literature, 07/91 - The John Hopkins University/Applied Physics Laboratory	07/91
14	The Facts - Electric and Magnetic Fields, 06/90 - State Electricity Commission of Victoria (SEC)	06/90
15	Your Guide to Understanding EMF an Your Home, 1993 - Culver Company	1993
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PO-IR-1  
DOCKET NO. 03-0417  
PAGE 16 OF 28

	Title	Date
1	WHO - Environmental Health Criteria 35: Extremely Low Frequency (ELF) Fields (WHO, Geneva '84)	1984
2	WHO - Environmental Health Criteria 69: Magnetic Fields (WHO, Geneva '87)	1987
3	"Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields (1989)" - Radiation Health Series No. 30, 11/89 - National Health and Medical Research Council	1989
4	Electromagnetic Fields and the Risk of Cancer, Volume 3, No. 1, 1992 - National Radiological Protection Board (NRPB)	1992
5	"Questions & Answers About Electric & Magnetic Fields (EMFs)," Environmental Protection Agency, Radiation & Indoor Air Radiation Studies Division (6603J), 402-R-92-009, Dec 1992, C:EPA	1992
6	"Electromagnetic Fields and the Risk of Cancer," National Radiological Protection Board (UK), Vol. 3, No. 1 (1992)	1992
7	"The National Electric & Magnetic Fields Research & Communication Program: Draft Strategic Plan," US Department of Energy, Washington, DC, May 1993, C:DOE	1993
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14	"Possible Health Effects of Exposure to Residential Electric & Magnetic Fields," C Stevens, Chairman, Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems, 1977, pp1-356, C:National Academy of Sciences	1997
15	Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992, (ISBN 0-309-06543-7), 1999 - National Research Council	1999
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17	ELF Electromagnetic Fields and the Risk of Cancer - Report of an Advisory Group on Non-ionising Radiation Volume 12 No 1 2001 (ISSN 0958-5648; ISBN 0-85951-456-0), 2001 - National Radiological Protection Board	2001
18	Biological Effects of High-Strength Electric Fields on Small Laboratory Animals, 07/81 - US Dept. of Energy (DOE/RL/01830-T7)	07/81
19	U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989)	05/89
20	Potential Health Effects of Electric and Magnetic Fields from Electric Power Facilities, 9/15/89 - California PUC/California Dept. of Health Services	09/15/89
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# **List of Available Government Publications on EMF**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 17 OF 28

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23	Progress Report to the California State Legislature by the California Department of Health Services in Cooperation with the California Public Utilities Commission on the Electromagnetic Fields Health Effects Program, 12/1/90	12/01/90
24	Potential Carcinogenicity of Electromagnetic Fields, 1/29/92 - US Environmental Protection Agency	01/29/92
25	"Health Effects of Exposure to Powerline-Frequency Electric and Magnetic Fields," Electro-Magnetic Health Effects Committee, Public Utility Commission of Texas (03/92)	03/92
26	"Health Effects of Low-Frequency Electric & Magnetic Fields," Prepared by Oak Ridge Associated Universities (ORAU) Panel for Committee on Interagency Radiation Research & Policy Coordination (CIRRPC), Jun 1992, contract DE-AC05-76OR00033 between ORAU & DOE, C:ORAU	06/92
27	"High-Voltage Transmission Lines: Summary of Health Effects Studies," Staff Report, California Energy Commission, Jul 1992, P700-92-002, pp1-27, C:CEC	07/92
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31	DOH Policy Relating To Electric and Magnetic Fields From Power- Frequency Sources. State of Hawaii DOH, Jan 19, 1994	01/19/94
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34	Public Utilities Commission of the State of Hawaii: Decision and Order No. 13201.	04/07/94
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36	Questions and Answers About EMF Electric and Magnetic Fields Associated with the Use of Electric Power, (DOE/EE-0040), 01/95 - National Institute of Environmental Health Sciences & U.S. Dept. of Energy	01/95
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38	U.S. Congress, Office of Technology Assessment, "Risk to Students in School," OTA-ENV-633, Sept 1995	09/95
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40	"Progress Report on the Electric & Magnetic Fields Research & Public Information Dissemination Program," EMF Interagency Committee, EMF RAPID, DOE/EE-0088, Dec 1995, pp1-7, A1-L1, C:DOE	12/95
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## **List of Available Government Publications on EMF**

PO-IR-1  
DOCKET NO. 03-0417  
PAGE 18 OF 28

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- 43 National Wireless Facilities Siting Policies: Fact Sheet #2. Federal Communications  
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- 44 "Electric Energy Systems & Storage," Senate Appropriations, Report 103-147, p 89
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09/96

09/17/96

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PO-IR-1  
DOCKET NO. 03-0417  
PAGE 19 OF 28

	<b>Title</b>	<b>Date</b>
1	WHO - Environmental Health Criteria 35: Extremely Low Frequency (ELF) Fields (WHO, Geneva '84)	1984
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3	Electromagnetic Fields & Energy, H Haus, J Melcher, 1998, pp1-742, C:1989 Prentice-Hall, Inc, division of Simon & Schuster, New Jersey	1989
4	Biological Effects of Electric and Magnetic Fields--Beneficial and Harmful Effects, Volume 2, 1994 - David O. Carpenter/Sinerik Ayrapetyan	1994
5	Biological Effects of Electric and Magnetic Fields--Sources and Mechanisms, Volume 1, 1994 - David O. Carpenter/Sinerik Ayrapetyan	1994
6	Power Frequency Magnetic Fields and Public Health, (9420; ISBN 0-8493-9420-1), 1995 - William F. Horton, Saul Goldberg	1995
7	"Possible Health Effects of Exposure to Residential Electric and Magnetic Fields," National Research Council. National Academy Press, Washington, D.C. 1997.	1997
8	Research on Power-Frequency Fields Completed Under the Energy Policy Act of 1992, (0-309-06543-7), 1999 - National Research Council	1999
9	"Biological & Health Effects from Exposure to Power-Line Frequency Electromagnetic Fields: Confirmation of Absence of Any Effects at Environmental Field Strengths," (translated from the original Japanese edition: "Denjikai no Kenko Eikyo Sono Anzensei wo Kenshosuru," (published by Bundodo Co Ltd, Japan) H Takebe, T Shiga, M Kato, E Masada, 2001, English translation published by Ohmsha Ltd, 3-1 Kanda Nishiki-cho, Chiyoda-ku, Tokyo 101-8460, Japan, C: Takebe, Shiga, Kato, Masada	2001

**E. Regulatory Related Filings**

1. Docket No. 96-0116 (Waialua-Kuilima 46kV Line)
  - a. "Final Routing Report for the Waialua-Kuilima 46 kV Subtransmission Line Project, North Shore, Oahu, Hawaii," prepared by R. M. Towill Corporation, August 1993, submitted by letter dated April 22, 1996.
  - b. "Final Environmental Impact Statement, Waialua-Kuilima 46 kV Subtransmission Line Project, North Shore, Oahu, Hawaii," prepared by R. M. Towill Corporation, August 1993, submitted by letter dated April 22, 1996.
2. Docket No. 95-0094 (Maalaea-Lahaina Third 69kV Line)
  - a. "Final EIS, Maalaea-Lahaina Third 69kV Transmission Line Project, Maui, Hawaii," Maui Electric Company, Limited, prepared by Dames & Moore, March 1994, submitted by letter dated June 30, 1995.
3. Docket No. 94-0043 (Keahole-Kailua 69kV Line No. 3)
  - a. "Final EIS, Keahole-Kailua 69 kV Transmission Line Project," Hawaii Electric Light Company, Inc., prepared by CH2M Hill, January 1994, submitted by letter dated March 14, 1994.
  - b. HELCO's response to CA-IR-2, submitted by letter dated May 16, 1994 to the Division of Consumer Advocacy.
4. Docket No. 7602 (Kewalo-Kamoku 138 kV Transmission Line)
  - a. HECO's letter dated April 5, 1993 responding to the Consumer Advocate's information request CA-IR-101, subpart c.
  - b. HECO's letter dated July 23, 1993 responding to the Commission's information requests PUC-IR-1 and PUC-IR-3.
5. Docket No. 7539 (Maalaea-Naalee 69 kV Transmission Line)
  - a. "Routing Report, Maalaea-Naalee 69kV Transmission Line Project, Maui, Hawaii," Maui Electric Company, Limited, prepared by Dames & Moore, September 1992, submitted by letter dated November 24, 1992.
6. Docket No. 7526 (Archer-Kewalo 138 kV Transmission Lines)
  - a. HECO's letter dated July 23, 1993 responding to the Commission's information requests PUC-IR-1 and PUC-IR-3.

7. Docket No. 7256 (Waiau-CIP 138kV Transmission Lines, Part 2)

- a. Routing Report, Waiau-Campbell Industrial Park 138 kV Transmission Line, Part 2-Ewa Nui Substation to Waiau Power Plant, prepared by CH2M Hill, February 1992, submitted by letter dated March 16, 1992.
- b. HECO's response to the Consumer Advocate's engineering information request CA-EIR-105, submitted by letter dated April 27, 1992.
- c. Final Environmental Impact Statement, Waiau-Campbell Industrial Park 138 kV Transmission Lines, Part 2-Ewa Nui Substation to Waiau Power Plant, prepared by CH2M Hill, August 1992, submitted by letter dated October 7, 1992.
- d. HECO's written direct testimony of Francis Hirakami (HECO T-2) submitted on November 18, 1992.
- e. HECO's responses to the Consumer Advocate's information requests CA-IR-3, CA-IR-4, and CA-EIR-109, submitted on January 8, 1993.
- f. HECO's responses to WCC Associates information requests WCC-IR-140, WCC-IR-143, WCC-IR-149, and WCC-IR-150, submitted on January 8, 1993.
- g. HECO's responses to meeting information requests (based on a meeting with the Division of Consumer Advocacy on January 12, 1993), submitted to the Division of Consumer Advocacy (with a copy to the PUC) on January 26, 1993.
- h. Division of Consumer Advocacy's written testimony of Peter Lanzalotta, submitted on February 2, 1993.
- i. "Additional 138 kV EMF Readings," HECO letter to the Division of Consumer Advocacy submitted on February 12, 1993 in Docket Nos. 7133 and 7256.
- j. "Public Briefing on Electric & Magnetic Fields," HECO letter to the Commission submitted on February 16, 1993. (An identical letter was submitted by HECO to the Division of Consumer Advocacy.)
- k. "Magnetic Field Level Calculation," HECO letter to the Division of Consumer Advocacy submitted on February 25, 1993.
- l. Village Park Community Association, Motion for Enlargement of Time to Intervene and Motion to Intervene, filed March 5, 1993.
- m. HECO's written rebuttal testimonies and exhibits of J. Michael Silva (HECO RT-4) and Dr. Howard Wachtel (HECO RT-5) submitted on March 24, 1993.

- n. Elected Official's written testimony and exhibits of Arnold Morgado, Jr., submitted on March 31, 1993.
  - o. Village Park Community Association's written testimonies of Frederick Dodge, M.D., Samuel Milham, Jr., M.D., and Cynthia Sage, submitted on March 31, 1993.
  - p. HECO's written supplemental rebuttal testimonies and exhibits of J. Michael Silva (HECO SRT-4), Richard Bockman, M.D., Ph.D. (HECO SRT-5A), and Darwin Labarthe, M.D., Ph.D. (HECO SRT-5B) submitted on April 5, 1993.
  - q. Division of Consumer Advocacy's written rebuttal testimony of Peter Lanzalotta, submitted on April 5, 1993.
  - r. HECO's Opening Brief, filed June 28, 1993.
  - s. PUC evidentiary hearing testimonies of J. Michael Silva and Dr. Howard Wachtel on April 7, 1993, Samuel Milham, Jr., M.D. and Cynthia Sage on April 8, 1993, Richard Bockman, M.D., Ph.D., and Darwin Labarthe, M.D., Ph.D. on April 9, 1993, Leslie Au on April 12, 1993, Frederick Dodge, M.D., on April 30, 1993, and John Cooper on July 29, 1993. (A copy of the transcripts is available at HECO's Regulatory Affairs Office.)
  - t. "Calculation of Magnetic Field Levels from Underground Transmission Lines," Goodsill Anderson Quinn & Stifel letter to the Commission submitted on July 16, 1993.
  - u. "Calculation of Magnetic Field Levels from Underground Transmission Lines," HECO letter to the Commission submitted on July 19, 1993.
  - v. HECO's Reply Brief, filed September 2, 1993.
8. Docket No. 7133 (Waiau-CIP 138kV Transmission Lines, Part 1)
- a. Routing Report, Waiau-Campbell Industrial Park 138 kV Transmission Line, Part 1-CIP to Ewa Nui Substations, Ewa, Oahu, prepared by CH2M Hill, October 1991, submitted to the Commission by letter dated October 8, 1991.
  - b. Final Environmental Assessment, Waiau-Campbell Industrial Park 138 kV Transmission Lines Project, Part 1-CIP to Ewa Nui Substations, Ewa, Oahu, prepared by CH2M Hill, February 1993, submitted to the Commission by letter dated February 16, 1993.

9. Docket No. 6789 (Waiau-Makalapa 138kV Line No. 2)

- a. Final Environmental Assessment and Routing Report, Waiau-Makalapa No. 2 138 kV Transmission Line Project, prepared by CH2M Hill, May 1990, submitted as part of the Application for the Waiau-Makalapa 138kV Line No. 2 project on August 24, 1990.
- b. Testimony of George Iwahiro (HECO T-2) submitted by letter dated April 19, 1990.
- c. Testimony of George Iwahiro at the PUC evidentiary hearing held on April 22, 1991.

**F. Environmental Assessments/Environmental Impact Statements (EA/EIS)**

1. Environmental Assessment, East O'ahu Transmission Project, 46kV Phase Project, Draft EA dated August 2004, prepared by Belt Collins Hawaii Ltd., submitted to the Public Utilities Commission in August 2004.
2. Environmental Impact Statement, Kamoku-Pukele 138-kV Transmission Line Project, Revised Final EIS dated September 2000, Revised Draft EIS dated September 1999, Final EIS dated December 1998, Draft EIS dated May 1998, prepared by CH2M Hill, submitted to the Board of Land and Natural Resources.
3. Maalaea-Lahaina Third 69kV Transmission Line Project, Maui, Hawaii, Maui Electric Company, Limited, Final EIS dated March 1994, prepared by Dames & Moore, submitted to the State Department of Land and Natural Resources
4. Environmental Impact Statement, Keahole-Kailua 69 kV Transmission Line Project, Hawaii Electric Light Company, Inc., Final EIS dated January 1994, prepared by CH2M Hill, submitted to the State Department of Land and Natural Resources.
5. Environmental Impact Statement, Waialua-Kuilima 46 kV Subtransmission Line Project, North Shore, Oahu, Hawaii, Final EIS dated August 1993, prepared by R. M. Towill Corporation, submitted to the City Department of Planning & Permitting.
6. Environmental Assessment, Waiau-Campbell Industrial Park 138 kV Transmission Lines Project, Part 1-CIP to Ewa Nui Substations, Ewa, Oahu, Final EA dated February 1993, prepared by CH2M Hill, submitted to the State Department of Land and Natural Resources.
7. Environmental Impact Statement, Waiau-Campbell Industrial Park 138 kV Transmission Lines, Part 2-Ewa Nui Substation to Waiau Power Plant, Final EIS dated August 1992, prepared by CH2M Hill, submitted to the State Department of Transportation.
8. Environmental Assessment and Routing Report, Waiau-Makalapa No. 2 138 kV Transmission Line Project, Final EA dated May 1990, prepared by CH2M Hill, submitted to the State Department of Transportation.
9. Environmental Assessment, Archer 138 kV Transmission Line, Final EA dated August 1989, prepared by R. M. Towill Corporation, submitted to the State Department of Land and Natural Resources.
10. Environmental Impact Statement, Proposed Halawa to Kamoku 138 KV Transmission Lines, Revised EIS dated February 1979, EIS dated January 1979, prepared by M&E Pacific, Inc., submitted to the State Department of Transportation.



History of Quarterly EMF Requests  
(01/1993 through 12/2003)

Qtr/Yr	Information Requests	Measurement Requests	Measurements Completed
Qtr 1, 1993	188	127	52
Qtr 2, 1993	420	61	92
Qtr 3, 1993	119	34	58
Qtr 4, 1993	59	27	27
Qtr 1, 1994	65	26	21
Qtr 2, 1994	62	26	20
Qtr 3, 1994	55	15	14
Qtr 4, 1994	25	10	12
Qtr 1, 1995	29	12	14
Qtr 2, 1995	38	9	9
Qtr 3, 1995	56	42	39
Qtr 4, 1995	33	11	11
Qtr 1, 1996	46	15	15
Qtr 2, 1996	42	14	16
Qtr 3, 1996	30	11	11
Qtr 4, 1996	18	8	8
Qtr 1, 1997	13	7	7
Qtr 2, 1997	16	6	6
Qtr 3, 1997	8	4	2
Qtr 4, 1997	11	4	4
Qtr 1, 1998	11	6	4
Qtr 2, 1998	15	8	6
Qtr 3, 1998	24	9	9
Qtr 4, 1998	15	7	8
Qtr 1, 1999	15	9	9
Qtr 2, 1999	13	5	5
Qtr 3, 1999	6	3	4
Qtr 4, 1999	4	4	2
Qtr 1, 2000	12	4	3
Qtr 2, 2000	11	5	6
Qtr 3, 2000	8	0	0
Qtr 4, 2000	17	2	2
Qtr 1, 2001	14	2	2
Qtr 2, 2001	16	5	5
Qtr 3, 2001	11	2	2
Qtr 4, 2001	13	3	3
Qtr 1, 2002	5	1	1
Qtr 2, 2002	6	1	1
Qtr 3, 2002	12	0	0
Qtr 4, 2002	6	2	2
Qtr 1, 2003	10	3	3
Qtr 2, 2003	8	1	0
Qtr 3, 2003	6	0	1
Qtr 4, 2003	2	2	2

Graph on following page

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000



September 22, 2004

[REDACTED]

Dear Mr. and Mrs. [REDACTED]

Attached is a report summarizing the electromagnetic field survey conducted at the following address:

[REDACTED]

During the survey, you asked us about the range of EMF readings in households. From our research, we found that a comprehensive study of contemporary magnetic field exposure was performed for the U.S. Department of Energy (Enertech 1998). The objective of this work was to characterize personal magnetic field exposure of the general population to ambient 60hz magnetic fields. The study population included about 1,000 randomly selected individuals across the United States and measured exposure levels ranging between 0.05 mG and 15.00 mG.

If we can be of further assistance, please call Karen Watanabe at 543-7969 or myself at 543-7741.

Sincerely,

Ka'iulani de Silva  
Director, Education & Consumer Affairs  
Government & Community Affairs Department

KdS:kw

Attachments

## **HAWAIIAN ELECTRIC CO. ELECTROMAGNETIC FIELD SURVEY REPORT**

**By:** Karen Watanabe

**Customer:** [REDACTED]  
[REDACTED]  
[REDACTED]

**HECO Representatives:** Karen Watanabe & Ruth Haisuka  
Education & Consumer Affairs

**Date/Time of Survey:** September 15, 2004 @ 10:15 a.m.

**Objective:** General survey and measurement of magnetic fields at property.

**Findings:** The survey conducted focused on measurements of various locations within your home and of the appliances in the home. The measurements are summarized in the table for **MAGNETIC FIELD VALUES AT VARIOUS LOCATIONS AND OF VARIOUS APPLIANCES.**

**Summary:** Magnetic fields dramatically decrease as the distance from the source increases. Also, please note that magnetic fields can cancel and/or add from two or more sources. The readings provided may be different at different times due to the use of electricity in the residence and electrical distribution facilities servicing the neighborhood.

**Measuring equipment:** DEXSIL, Field St\*r Magnetic Field Recorder. This recorder has a true RMS magnitude sensing of 60hz magnetic fields along 3 axes. It has a resolution of 0.04mG in the 0-10mG range, and an accuracy of 1% of full scale. The magnetic fields are measured in milligauss (mG).

# **Magnetic Field Values at Various Locations and Appliances**

Description of Locations/Appliances		Distance	magfield (mg)
1	Center of dining room, overhead fluorescent lamp on		1.44
2	Center of kitchen, overhead fluorescent lamp off		1.44
3	Center of kitchen, overhead fluorescent lamp on		1.98
4	Overhead fluorescent lamp in kitchen	1 foot	1.88
5	Center of family room, overhead fluorescent lamp off, TV off		1.28
6	Center of family room, overhead fluorescent lamp off, TV on		1.36
7	TV in family room	1 foot	7.60
8	Center of Louisa's bedroom, overhead lights off		1.04
9	Center of living room, overhead lights off, ceiling fans off		1.76
10	Center of living room, overhead lights off, ceiling fans on		1.72
11	Center of Tim's bedroom		1.84
12	Center of Sophia's bedroom, air filter on		2.72
13	Center of Sophia's bedroom, air filter off		2.44
14	Air filter in Sophia's bedroom	1 foot	5.64
15	Center of Isaiah's bedroom, air filter on		3.72
16	Center of Isalah's bedroom, air filter off		3.20
17	Center of Luczak's bedroom		3.52
18	Center balcony, outside of Luczak's bedroom		3.92
19	Blow dryer	1 foot	4.86
20	Center of downstairs living room		2.04
21	At window of downstairs living room		2.96
22	Microwave oven in downstairs kitchen	1 foot	32.56